CLAIMS

What is claimed is:

1. A method for manufacturing a light-emitting panel in a web configuration comprising:

(a) providing a first substrate in a web form, the first substrate having a plurality of first conductors formed thereon;

(b) disposing at least one micro-component of a plurality of micro-components at each of a plurality of first locations on the first substrate corresponding to the plurality of conductors, each micro-component adapted to emit radiation in response to electrical excitation;

(c) depositing a liquid dielectric material onto the first substrate to electrically isolate the plurality of micro-components from each other;

(d) curing the liquid dielectric material to form a dielectric layer;

(e) depositing a conductive liquid on top of the dielectric layer at a plurality of second locations adapted to interact with the first conductors to excite one or more selected micro-components;

(f) curing the conductive liquid to create a conductive film for providing second conductors;

(g) applying a top layer over the dielectric layer and the second conductors.

2. The method of claim 1, wherein the micro-components are coated with a phosphor material

3. The method of claim 2, wherein the phosphor material is applied to the micro-components by immersing the micro-components in a slurry of phosphor particles, then curing a phosphor coating formed on the micro-components.

4. The method of claim 1, further comprising, prior to step (g), the steps of depositing a liquid black mask layer onto the first substrate and the conductive layer; and

curing the liquid mask material to form a black mask layer.

5. The method of claim 1, further comprising:

photolithographically patterning the conductive film to form the second conductors.

6. The method of claim 5, wherein the step of photolithographically patterning comprises selectively exposing a photosensitive material by contacting the photosensitive material with a leaky optical waveguide.

7. The method of claim 1, wherein the first substrate has a plurality of dimples formed therein, wherein one dimple is formed at each of the plurality of first locations.

8. The method of claim 7, wherein an adhesive material is applied within each of the plurality of dimples for securing the micro-component in the dimple.

9. The method of claim 1, wherein the step of depositing a conductive liquid comprises printing an electrode pattern with a conductive ink.

10. The method of claim 9, wherein the printing comprises inkjet printing.

11. The method of claim 1, wherein the liquid dielectric material has a surface tension adapted to provide a uniform thickness across the first substrate.

12. The method of claim 1, wherein the liquid dielectric material includes a surfactant.

13. The method of claim 1, further comprising disposing an RF screen over the top layer.

14. The method of claim 1, further comprising, prior to step (g), repeating steps (c) through (f) at least one time to form additional conductors.

15. A method for forming a flexible light emitting panel comprising:

(a) feeding a first dielectric substrate material from a payout reel in a web coating machine;

(b) printing a first plurality of electrodes on the first dielectric material;

(c) before or after printing the first plurality of electrodes, forming a plurality of sockets at a plurality of location in the first dielectric material;

(d) disposing at least one micro-component in each socket of the plurality of sockets, wherein the at least one micro-component is adapted to emit light in response to electrical excitation;

(e) applying a liquid dielectric material over the first dielectric material, the first plurality of electrodes, and at least a portion of each micro-component of the plurality of micro-components;

(f) curing the liquid dielectric material to form a dielectric layer;

(g) printing a second plurality of electrodes over the dielectric layer using a conductive ink;

(h) curing the conductive ink;

(i) applying a top layer over the dielectric layer, the second plurality of electrodes and the micro-components.

16. The method of claim 15, further comprising the step of applying an adhesive material within each of the plurality of sockets for securing the micro-component in the socket.

17. The method of claim 15, wherein step (d) comprises using electrostatic sheet transfer to place each micro-component into an appropriate socket

18. The method of claim 15, wherein step (g) comprises inkjet printing.

19. The method of claim 15, wherein the liquid dielectric material has a surface tension adapted to provide a uniform thickness across the first substrate.

20. The method of claim 15, wherein the liquid dielectric material includes a surfactant.

21. The method of claim 15, further comprising disposing an RF screen over the top layer.

22. The method of claim 15, further comprising, prior to step (i), repeating steps (e) through (h) at least one time to form at least one additional plurality of electrodes.

23. The method of claim 15, wherein the micro-components are coated with a phosphor material

24. The method of claim 23, wherein the phosphor material is applied to the micro-components by immersing the micro-components in a slurry of phosphor particles , then curing a phosphor coating formed on the micro-components.

25. The method of claim 15, further comprising, prior to step (i), the steps of depositing a liquid black mask layer onto the first substrate and the conductive layer; and

curing the liquid mask material to form a black mask layer.

26. A method for forming a flexible light emitting panel comprising:

(a) feeding a first dielectric substrate material from a payout reel in a web coating machine;

(b) printing a first plurality of electrodes on the first dielectric material;

(c) before or after printing the first plurality of electrodes, forming a plurality of sockets at a plurality of location in the first dielectric material;

(d) disposing at least one micro-component in each socket of the plurality of sockets, wherein the at least one micro-component is adapted to emit light in response to electrical excitation;

(e) aligning a second sheet material having dielectric properties over the first dielectric substrate material and the first plurality of electrodes, wherein the second dielectric sheet material has a plurality of openings therethrough corresponding to the plurality of locations, the plurality of openings having diameters larger than an outer diameter of the micro-component; so that a gap is created between an inner diameter of each opening and the outer diameter of each micro-component;

(f) applying a liquid dielectric material over at least a portion of the second sheet material so that the gap corresponding to each micro-component is filled, the liquid dielectric material having dielectric properties adapted for control of electric field and breakdown characteristics of the micro-component;

(g) curing the liquid dielectric material;

(h) printing a second plurality of electrodes over the second sheet material using a conductive ink;

(i) curing the conductive ink;

(j) applying a top layer over the second sheet material, the second plurality of electrodes and the micro-components.

27. The method of claim 26, further comprising the step of applying an adhesive material within each of the plurality of sockets for securing the micro-component in the socket.

28. The method of claim 26, wherein step (d) comprises using electrostatic sheet transfer to place each micro-component into an appropriate socket

29. The method of claim 26, wherein step (h) comprises inkjet printing.

30. The method of claim 26, wherein the liquid dielectric material includes a surfactant.

31. The method of claim 26, further comprising disposing an RF screen over the top layer.

32. The method of claim 26, further comprising, prior to step (j), repeating steps (e) through (i) at least one time to form at least one additional plurality of electrodes.

33. The method of claim 26, wherein the micro-components are coated with a phosphor material

34. The method of claim 33, wherein the phosphor material is applied to the micro-components by immersing the micro-components in a slurry of phosphor particles , then curing a phosphor coating formed on the micro-components.

35. The method of claim 26, further comprising, prior to step (j), the steps of depositing a liquid black mask layer onto the first substrate and the conductive layer; and

curing the liquid mask material to form a black mask layer.